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FAIRS Subject Report

Grain and Oilseed Standards

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Report Highlights:
On July 3, 2008, China notified the WTO of the National Standard GB 1353—2007 "National Standard for Corn" as TBT/N/CHN/403 and National Standard GB-1532-2006 "National Standard for Soybeans" as TBT/N/CHN/402. These standards specify the relevant terms and definitions, classifications, quality requirements, test methods, and requirements for labeling, packaging, transportation and storage of corn and soybeans. GB/T 5490 General Rules of Inspection Grain, Oilseeds and Vegetable Oils is referenced in that standard and published here as a reference in reviewing TBT/N/CHN/403 and 402. This report is an UNOFFICIAL translation of GB/T 5498.

Includes PSD Changes: No
Includes Trade Matrix: No
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Beijing [CH1]
[CH]

Executive Summary: On July 3, 2008, China notified the WTO of the National Standard GB 1353—2007 "National Standard for Corn" (Replacing GB 1353-1999) as TBT/N/CHN/403. This standard specifies the relevant terms and definitions, classifications, quality requirements, test methods, and requirements for labeling, packaging, transportation and storage of corn. This standard also applies to testing, evaluation and identification of the quality of corn. The date for submission of final comments to the WTO is September 3, 2008. The proposed date of adoption is 90 days after circulation by the WTO Secretariat (October 3, 2008) and the proposed date of entry into force is 6 months after adoption (January 3, 2009). This is notified as GAIN Report CH8069.

On July 3, 2008, China notified the WTO of the National Standard GB-1532-2006 "National Standard for Soybeans" (Replacing GB 1352-1986) as TBT/N/CHN/402. This standard specifies the relevant terms and definitions, classifications, quality requirements, test methods, and requirements for labeling, packaging, transportation and storage of soybeans. This standard also applies to testing, evaluation and identification of the quality of commercial soybeans. The date for submission of final comments to the WTO is September 3, 2008. The proposed date of adoption is 90 days after circulation by the WTO Secretariat (October 3, 2008) and the proposed date of entry into force is 6 months after adoption (January 3, 2009). This is notified as GAIN Report CH8066.

One of the measures that is referenced in the proposed National Standard is GB/T 5490 General Rules of Inspection Grain, Oilseeds and Vegetable Oils. This standard has not been notified to the WTO. This National Standard, along with other standards published in GAIN Reports CH8097-CH8105, is being published so that GB 1353—2007 "National Standard for Corn" TBT/N/CHN/403 and GB-1532-2006 "National Standard for Soybeans" TBT/N/CHN/402 can be reviewed with this additional pertinent information.

Thanks go to the United States Soybean Export Council – International Marketing and the U.S. Grains Council for their support in translating this measure.

BEGIN TRANSLATION

National Standard of the People's Republic of China

GB 5490-85

General Rules of Inspection Grain, Oilseeds and Vegetable Oils

Issued on Nov. 2, 1985   Implemented on July 1, 1986

This standard is applicable to quality inspection of commodity grain, oilseeds and vegetable oils.

1   Grain and Oilseeds Samples

Samples refer to a certain quantity of a representative portion that is obtained from the grain and oilseeds to be inspected as specified. It is the main basis that determines the quality of a batch of grain or oilseeds.

1.1   Primary samples: Primary samples refer to the samples initially obtained from the batch of grain or oilseeds to be inspected. The quantity of primary samples is determined as per the quantity of a batch of grain and oilseeds and requirements satisfying quality inspection. The weight of primary sample of grain and oilseeds is generally no less than 2kg while that of vegetable oils is no less than 1kg. And the weight of samples of randomly purchased grain and oilseeds can be reduced according to circumstance.

1.2   Average samples: Average samples refer to a portion symmetrically divided from primary samples as specified after averagely mixed. The weight of average sample is generally no less than 1kg.

1.3   Test samples: Test samples refer to a portion to be used for testing weighed and taken from average samples as needed after mixture and sample reduction, which is called Sample for short. The dosage of test samples should be in accordance with the specification in Chapter 7.

1.4   Registration of samples: Samples must be registered and the registration items include: sampling date, sample number, title of grain or oilseed, representative quantity, origin, year of production, disposition of sample (number of vehicle, ship, warehouse and stacking), packaging or bulk, name of sampling personnel, etc..

1.5   Preservation of samples: No less than 1kg primary sample from grain and oilseeds for redeploying and exporting should be preserved and then well stored (samples with moisture exceeding safety standard should be stored in a temperature below 15? and oil samples should be kept in a dark place) in a dry and cool place in a month for retesting after registration, sealing, being stamped and signed by handler.

2   Arbitration Method

If there is only one test method or the first method in more than two methods for one test item, it could be referred to the arbitration method except for those especially indicated. Arbitration test should be subjected to the arbitration method.

3   Original Record and Inspection sheet

Keep a complete original record after inspection of every batch of grain and oil. Fill in exactly the quality inspection sheet according to the results of inspection.

4   Water for Chemical Analysis and Reagent Apparatus

Water for chemical analysis in each inspection item should be disuntiled water and the reagent for chemical analysis should be chemical pure reagent except for benchmark substance and those which are specially indicated with the requirements for purity of the reagent. Case-hardened product should be utilized as the apparatus as much as possible and non-case-hardened product should cater to requirements of error.

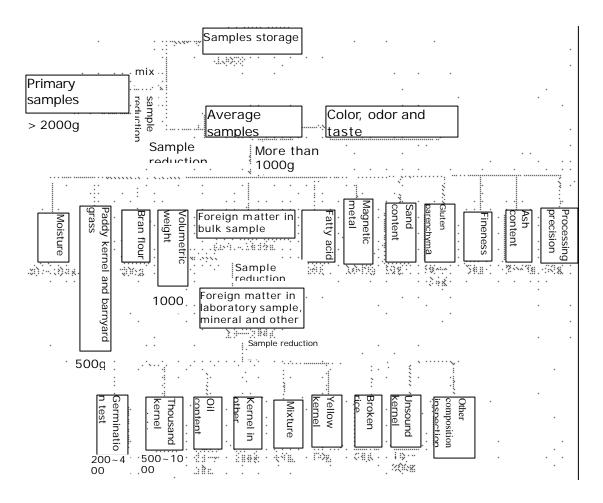## 5   Calculation of Inspection Results

For calculation of inspection results in each inspection item, after confirmation of validation numbers, other data should be accepted or rejected according to the regulation "Round up when larger than 5, round down when less than 5; if 5, not even rounding into odd spaces".

6   Safety Measures

If toxic and deleterious gas generates during samples analysis, the operation should be carried out in fume cupboard to ensure safety.

7   Inspection Procedure for Grain and Oilseeds & Regulations of Test Sample Dosage

As for inspection procedure for grain and oilseeds and regulations for test sample dosage, please refer to the fig. below:

Annex A
Error and Data Processing
(Informative Annex)

A.1   Error

Error refers to the difference between measured value and true value, to determine the accuracy of the measured value. It can be divided into systematic error and accidental value according to its origin.

A.1.1 Systematic error

Systematic error refers to errors from apparatus, reagent, analysis method and operation etc. The following methods can be used for verification and emendation.

A.1.1.1   Correct applied metering devices and apparatus.

A.1.1.2   Contrast test: Use standard methods or typical methods, or standard substance in known content, or have contrast test with recovery rate to inspect the volume of error.

$$\text{Recovery rate (\%)} = \frac{x_1 - x_2}{W} \times 100 \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad \text{(A1)}$$

Where:

x_1——weight of tested substance measured after adding standard substance into the test sample;

x_2——weight of tested substance in the test sample;

w——the weight of standard substance added into the test sample.

A.1.1.3   Blank test: Don't add any test sample during operation procedure. Lastly, subtract blank value from the measured values of test sample in order to detect errors from reagent.

A.1.2 Accidental error

Accidental error refers to errors caused by temperature, moisture, air pressure and other kinds of accidental elements. It can be controlled in a certain range by repeatedly measuring.

A.2   Valid Digit

Valid digit refers to the reliability degree of the digit in data. One suspicious digit can be reserved in data. If the weight of substance is 12.3g, because its weighing accuracy is 0.1g and there are 3 valid digits, it cannot be written as 12.30g.

"0" in data, "0" in 0.0003 is not a valid digit; "0" in the end of data, e.g., 35600, when there are 3 valid digits, it should be written as 3.56×10^4.

When adding, subtracting, multiplying and dividing values, reserved decimal digits should be as same as the least decimal digits among the values.

After confirmation of valid digits, the remaining digit should be accepted or rejected according to regulation "Round up when larger than 4", or "round up when larger than 5" (if 5, not even rounding into odd spaces).

A.3   Accuracy and Precision

A.3.1 Accuracy: It refers to the proximity degree between measured value and true value. Absolute error and relative error expresses the difference degree between the two values.

Absolute error (R) = x-μ........................   (A2)

Where: x—measured value

μ — true value

Relative error is the percentage error taken up from true value by absolute error.

$$\text{Relative error (\%)} = \frac{R}{m} \times 100 \dots\dots\dots\dots\dots \quad \text{(A3)}$$

Where: R — absolute error

μ — true value

Accuracy can be expressed as relative error. When true value is not easy to acquire, precision is usually used instead of accuracy.

A.3.2   Precision: Precision refers to the match degree between each measured values in a set. Higher precision indicates good recurrence among each measured value. Precision is usually expressed by standard deviation (S). Smaller S indicates small variation degree of measured value.

Supposing measuring times is n, using $x_1 x_2 x_3 \ldots\ldots x_n$ to express each measured values in a set and $\overline{X}$ (read as x bar) to express the average value of each measured value, the difference between each measured value and $\overline{X}$ is called deviation (d), $\overline{X}$ and S can be acquired by formula (A4) and (A5).

$$\overline{X} = \frac{\sum x}{n} \quad\ldots\ldots\ldots\ldots\ldots\ldots \quad (A4)$$

Where, $\overline{X}$ —average value of each measured value;

$\sum$ — symbol of product adding, read as Sigma;

$\sum x$ — the sum of measured values;

n — times of measuring.

$$S = \sqrt{\frac{\sum (x - X)^2}{n-1}} = \sqrt{\frac{\sum d^2}{n-1}} \quad\ldots\ldots\ldots\ldots\ldots\ldots \quad (A5)$$

Where: S—standard deviation;

$(x. \overline{x})^2$ — square of difference between measured value and average value

d^2 — square of deviation.

E.g. apply the related values in the following table A1 to calculate S

Apply the values in formula (A5):

$$S = \sqrt{\frac{0.0520}{5-1}} = 0.114$$

There are four usages of standard deviation S:

A.3.2.1   Determine the dispersion degree of measured values distribution. Larger S indicates the distribution of measured values around average value is scattered, the representativeness of average value is bad; whereas, smaller S indicates the representativeness of average value is good.

A.3.2.2   Estimate the distribution status of measured values frequency. The calculation applying $\overline{x}$ and S can estimate the appearance probability of each measured value in the interval $\overline{x} \pm S$ according to the area distribution rule under normal curve.

5 times measured results' percentage of wheat protein content (percentage accounting for dry matter), refer to Table A1

Table A1

Measured	Deviation	Square of deviation	

A.3.2.3   Calculate coefficient of variation using S. When the units of two sets of measured values are different or there is a great difference between two sets of average values, determine its degree of variation by individually transforming the S into coefficient of variation (CV). The set with smaller CV indicates small degree of variation. Calculate according to formula (A6):
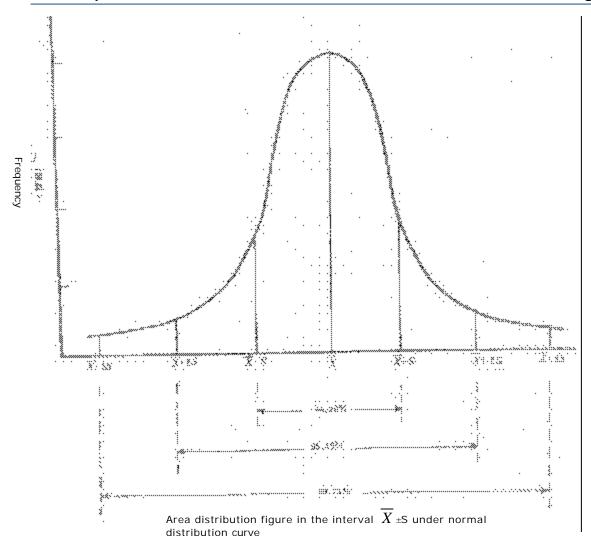
$$CV\ (\%) = \frac{S}{X} \times 100 \dots\dots\dots\dots\dots\dots\dots\quad (A6)$$

A.3.2.4   Calculate standard error by S. The standard deviation of sample average number is referred to standard error ($S_{\hat{x}}$). $S_{\hat{x}}$ can be used to determine the proximity degree between sample average number and overall average number. Smaller $S_{\hat{x}}$ indicates good reliability of sample average number representing overall average number, whereas, larger $S_{\hat{x}}$ indicates bad reliability.

A.4 Normal Distribution

Normal distribution is mainly used to understand the distribution status of each measured value around average value in statistics.

The normal curve is a bell-shaped curve that never intersects with abscissa axis with a peak in the center and two gradually descending and symmetrical ends. There are certain rules on the area distribution under the curve (refer to the fig.). In the figure, $\overline{X}$ is the estimated value of overall average value m while S is the estimated value of overall standard deviation s and the total area under the curve is 100%. If a set of measured values conforms to normal distribution, the area of $\overline{X} \pm S$ accounts for 68.26% of total area; the area of $\overline{X} \pm 2S$ accounts for 95.4% of total area and $\overline{X} \pm 3S$ accounts for 99.73% of total area. In statistics 1.96S and 2.58S are usually used in calculation of theoretical frequency individually instead of 2S and 3S.

Frequency

Area distribution figure in the interval $\overline{X} \pm S$ under normal distribution curve

There are different expression methods for area in a certain interval. When $u = \dfrac{x - m}{S}$ is any value, calculate theoretical frequency by checking the normal curve. The center of values in the table is not "$\overline{X}$", but "O", corresponding to one-sided area of different values of u. For example, when u=1.5, the one-sided area is 0.4332, namely, 43.32%; repeatedly measure starch content in paddy (percentage accounting for dry matter) for 60 times, and $\overline{X}$ =71.55, S=2.08, calculate the theoretic frequency in the interval 70.14~74.39%. Use $\overline{X}$ instead of m, S instead of S, then,

u= $\dfrac{x - \overline{X}}{S}$ .... (A7)

Use the values in the formula:

$$u_1 = \frac{70.14 - 71.55}{2.08} = -0.68$$

$$u_2 = \frac{74.39 - 71.55}{2.08} = 1.37$$

Check table A2. When u_1=0.68, area of left side equals to 0.2516, and when u_2=1.37, area of right side equals to 0.4144. So the area in the interval -0.68~1.37 is 0.2516+0.4144=0.6660=66.60%, namely, the frequency of starch content is 66.60% in 60 in the interval 70.14~74.39%, approximately equals to 40 times (60×66.60%=40).

For areas under normal curve in a certain interval, please refer to table A2:

Table A2

u	Area	U	Area
0.0	0.0000	2.0	0.47725
0.1	0.0393	2.1	0.48214
0.2	0.0793	2.2	0.48610
0.3	.01179	2.3	0.48928
0.4	0.1554	2.4	0.49802
0.5	0.1915	2.5	0.49379
0.6	0.2257	2.6	0.495339
0.7	0.2580	2.7	0.496533
0.8	0.2631	2.8	0.497445
0.9	0.3159	2.9	0.498134
1.0	0.3413	3.0	0.498650
1.1	0.3643	3.1	0.4990324
1.2	0.3849	3.2	0.4993129
1.3	0.4032	3.3	0.4995166
1.4	0.41924	3.4	0.4996631
1.5	0.43319	3.5	0.4997674
1.6	0.44520	3.6	0.4998409
1.7	0.45543	3.7	0.4998922
1.8	0.46407	3.8	0.49992765
1.9	0.47128	3.9	0.49995190

A.5 Linear Regression

When the points on the standard curve deviate from line, draw a curve after calculating by linear regression equation.

$$y = a + bx$$ .... (A8)

Where: b — slope rate of beeline;

constant term in linear equation.

$$b = \frac{\sum(xy) - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$ .... (A9)

$$a = \frac{\sum y}{n} - \frac{b\sum x}{n}$$ .... (A10)

Supposing n=5, $\sum x$ =47.2, $\sum y$ =85.85, $\sum(xy)$ =821.266, $\sum x^2$ =459.26, $(\sum x)^2$ = $(47.2)^2$, substitute the values into the formula (A9) and (A10), b=0.978, a=7.884. Substitute values a and b into formula (A8)

$$y = 7.884 + 0.978x$$

When x=7, y=14.73; x=12, y=19.62.

Two pairs of values x and y calculated can confirm regressive beeline.

A.6 Related Coefficient

Related coefficient(r) expresses the related degree of two variables.

$$r = \frac{\sum(xy) - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]\left[\sum y^2 - \frac{(\sum y)^2}{n}\right]}}$$ .... (A11)

suppose there are five pairs of measured values in two sets, as in table A3:

Table A3

	I	II	III	IV	V	Average Values
Complete Relation	X 1 Y 3	2 5	3 7	4 9	5 11	3 7
Incomplete Relation	Z 1 Y 3	2 8	3 8	4 6	5 10	3 7

Taking the completely related values as example, calculate related coefficient r.

$\sum(xy) = 125$, $\sum x = 15$, $\sum y = 35$, $\sum x^2 = 55$, $\sum y^2 = 258$.

Substitute these values into formula (A11):

$$r = \frac{125 - \frac{15 \times 35}{5}}{\sqrt{\left(55 - \frac{15^2}{5}\right)\left(285 - \frac{35^2}{5}\right)}} = \frac{20}{\sqrt{10 \times 40}} = \frac{20}{20} = +1$$

If reverse the order of x in the table as 5, 4, 3, 2, 1, the relation between x and y is negative relation of complete relation, r equals to -1.

Annex B

Preparation and Calibration for Several Standard Solutions

(Informative Annex)

B.1   1N, 0.5N and 0.1N Sodium Hydroxide Standard Solution

B.1.1   Preparation: Prepare sodium hydroxide into saturated solution and inject it into plastic pail. Keep the pail airtight until the solution becomes clear. Siphon the upper clear solution before application.

a.   1N sodium hydroxide standard solution: Measure and take 52ml saturated sodium hydroxide solution and inject it into 1000ml water without carbon dioxide and shake it up evenly.

b.   0.5N sodium hydroxide standard solution: Measure and take 26ml saturated sodium hydroxide solution and inject it into 1000ml water without carbon dioxide and shake it up evenly.

c.0.1N sodium hydroxide standard solution: Measure and take 5ml saturated sodium hydroxide solution and inject it into 1000ml water without carbon dioxide and shake it up evenly.

B.1.2   Calibration

B.1.2.1   Determination method

a.   1N sodium hydroxide standard solution: Weigh up 6g benchmark potassium acid phthalate which was baked to constant weight in the temperature range 105~110? .with a weighing accuracy of 0.0002g. Dissolve it in 80ml water without carbon dioxide and add 2 drops of 1% phenothalin indicating liquid. Titrate with 1N sodium hydroxide solution until the pink color of solution is as same as standard color. Make a blank test simultaneously.

b.   0.5N sodium hydroxide standard solution: Weigh up 3g benchmark potassium acid phthalate which was baked to constant weight in the temperature range 105~110? .with a weighing accuracy of 0.0002g. Dissolve it in 80ml water without carbon dioxide and add 2 drops of 1% phenothalin indicating liquid. Titrate with 0.5N sodium hydroxide solution until the pink color of solution is as same as standard color. Make a blank test simultaneously.

c.   0.1N sodium hydroxide standard solution: Weigh up 0.6g potassium acid phthalate which was baked to constant weight in the temperature range 105~110? .with a weighing accuracy of 0.0002g. Dissolve it in 50ml water without carbon dioxide and add 2 drops of 1% phenothalin indicating liquid. Titrate with 0.1N sodium hydroxide solution until the pink color of solution is as same as standard color. Make a blank test simultaneously.

Note: Standard color preparation: Measure and take 80ml pH8.5 buffer solution and add 2 drops of 1% phenothalin indicating liquid and shake it up evenly.

B.1.2.2   Calculation

The equivalent concentration of sodium hydroxide standard solution is calculated as formula (B1)

$$N = \frac{G}{(V_1 - V_2) \times 0.2042}$$ .... (B1)

Where: G — weight of potassium acid phthalate, g;

V_1 — dosage of sodium hydroxide solution, ml;

V_2 — dosage of sodium hydroxide solution in blank test, ml;

0.2042 — potassium acid phthalate gram per milligram equivalent

B.1.3   Comparison

B.1.3.1   Determination method: Measure and take 30.00~35.00ml hydrochloric acid standard solution (1N, 0.5N, 0.1N) and add 50 ml water without carbon dioxide and 2 drops of 1% phenothalin indicating liquid. Titrate with sodium hydroxide solution in corresponding concentration. Heat the solution to 80? when approaching the end point and continue to titrate until the solution becomes pink.

B.1.3.2   Calculation: The equivalent concentration N of sodium hydroxide standard solution is calculated as formula (B2):

$$N = \frac{V_1 \cdot N_1}{V}$$ .... (B2)

Where: V_1 — dosage of hydrochloric acid standard solution, ml;

N_1 — equivalent concentration of hydrochloric acid standard solution, N;

V — dosage of sodium hydroxide solution, ml.

B.2   1N, 0.5N and 0.1N Hydrochloric Acid Standard Solution

B.2.1   Preparation

a.   1N hydrochloric acid standard solution: Measure and take 90ml concentrated hydrochloric acid and inject it into 1000ml water.

b.   0.5N hydrochloric acid standard solution: Measure and take 45ml concentrated hydrochloric acid and inject it into 1000ml water.

c.0.1N hydrochloric acid standard solution: Measure and take 9ml concentrated hydrochloric acid and inject it into 1000ml water.

B.2.2   Calibration

B.2.2.1   Determination method

a.   1N hydrochloric acid standard solution: Weigh up 1.6g benchmark anhydrous sodium carbonate which was burned to a constant weight in temperature range 270~300? , with a weighing accuracy of 0.0002g. Dissolve it in 50ml water, add 10 drops of mixed indicating liquid of Bromcresol green and Methyl-red. Titrate with 1N hydrochloric acid solution until the solution becomes dark red from green and keep the solution boiled for 2min. Continue to titrate until the solution becomes dark red after cooling.

b.   0.5N hydrochloric acid standard solution: Weigh up 0.8g benchmark anhydrous sodium carbonate which was burned to constant weight in temperature range 270~300? , with a weighing accuracy of 0.0002g. Dissolve it in 50ml water, add 10 drops of mixed indicating liquid of Bromcresol green and Methyl-red. Titrate with 0.5N hydrochloric acid solution until the solution becomes dark red from green and keep the solution boiled for 2min. Continue to titrate until the solution becomes dark red after cooling.

c.0.1N hydrochloric acid standard solution: Weigh up 0.2g benchmark anhydrous sodium carbonate which was burned to a constant weight in temperature range 270~300? , with a weighing accuracy of 0.0002g. Dissolve it in 50ml water, add 10 drops of mixed indicating liquid of Bromcresol green and Methyl-red. Titrate with 0.1N hydrochloric acid solution until the solution becomes dark red from green and keep the solution boiled for 2min. Continue to titrate until the solution becomes dark red after cooling.

B.2.2.2   Calculation

The equivalent concentration N of hydrochloric acid standard solution is calculated as formula (B3):

$$N = \frac{G}{(V_1 - V_2) \times 0.05299}$$ .... (B3)

Where: G—Weight of anhydrous sodium carbonate, g;

V_1—Dosage of hydrochloric acid solution, ml;

V_2—Dosage of hydrochloric acid solution in blank test, ml;

0.05299—Sodium carbonate gram per milligram equivalent.

B.2.3   Comparison: please refer to B.1.3 for method.

B.3   1N, 0.5N and 0.1N Sulfuric Acid Standard Solution

B.3.1   Preparation

a.   1N sulfuric acid standard solution: Measure and take 30ml concentrated sulfuric acid and slowly inject it into 1000ml water, cool and shake it up evenly.

b.   0.5N sulfuric acid standard solution: Measure and take 15ml concentrated sulfuric acid and slowly inject it into 1000ml water, cool and shake it up evenly.

c.0.1N sulfuric acid standard solution: Measure and take 3ml concentrated sulfuric acid and slowly inject it into 1000ml water, cool and shake it up.

B.3.2   Calibration: please refer to B.2.2 for method.

B.3.3   Comparison: please refer to B.2.3 for method.

B.4   1N and 0.1N Sodium Carbonate Standard Solution

B.4.1   Preparation

a.   1N sodium carbonate standard solution: Weigh up 53g anhydrous sodium carbonate and dissolve it in 1000ml water and shake it up evenly.

b.   0.1N sodium carbonate standard solution: Weigh 5.3g anhydrous sodium carbonate and dissolve it in 1000ml water and shake it up evenly.

B.4.2   Calibration

B.4.2.1   Determination Method

a.   1N sodium carbonate standard solution: Measure and take 30.00~35.00ml 1N sodium carbonate solution and add 50ml water and 10 drops of mixed indicating liquid of Bromcresol green and Methyl-red. Titrate with 1N hydrochloric acid standard solution until the solution becomes dark red from green and keep the solution boiled for 2min. Continue to titrate until the solution becomes dark red after cooling.

b.   0.1N sodium carbonate standard solution: Measure and take 30.00~35.00ml 0.1N sodium carbonate solution and add 20ml water and 10 drops of mixed indicating liquid of Bromcresol green and Methyl-red. Titrate with 0.1N hydrochloric acid standard solution until the solution becomes dark red from green and keep the solution boiled for 2min. Continue to titrate until the solution becomes dark red after cooling.

B.4.2.2   Calculation

The equivalent concentration N of sodium carbonate standard solution is calculated as formula (B4):

$$N = \frac{V_1 \cdot N_1}{V}$$ .... (B4)

Where: V_1—Dosage of hydrochloric acid standard solution, ml;

N_1—Equivalent concentration of hydrochloric acid standard solution, N;

V—Dosage of sodium carbonate solution, ml;

B.5   0.1N Potassium Dichromate Standard Solution

B.5.1   Preparation: Weigh up 5g potassium dichromate and dissolve it in 1000ml water and shake it up evenly.

B.5.2   Calibration

B.5.2.1   Determination method: Measure and take 30.00~35.00ml 0.1N potassium dichromate solution and put in into iodine graduated flask. Add 2g potassium iodide and 20ml 4N sulfuric acid and shake it up evenly and put it in a dark place for 10min. Add 150ml water and titrate with 0.1N sodium thiosulphate standard solution. Then add 3ml 0.5% starch indicating liquid when approaching the end point and continue to titrate until the solution becomes bright green from blue. Make a blank test simultaneously.

B.5.2.2   Calculation

The equivalent concentration N of potassium dichromate standard solution is calculated as formula (B5):

$$N = \frac{(V_1 - V_2)N_1}{V}$$ .... (B5)

Where: V_1—Dosage of sodium thiosulphate standard solution, ml;

V_2—Dosage of sodium thiosulphate standard solution in blank test, ml;

N_1—Equivalent concentration of sodium thiosulphate standard solution, N;

V—Dosage of potassium dichromate solution, ml.

B.6   0.1N Sodium Thiosulphate Standard Solution

B.6.1   Preparation: Weigh up 26g sodium thiosulphate (or 16g anhydrous sodium thiosulphate) and 3.8g borax and dissolve them in 100ml water. Slowly boil for 10 minutes, cool and filter for standby after laid for two weeks.

B.6.2   Calibration

B.6.2.1   Determination method: Weigh up 0.15g benchmark potassium dichromate which was baked to a constant weight in a temperature of 20? , with a weighing accuracy of 0.0002g and dissolve it in 25ml water in iodine graduated flask. Add 2g potassium iodide and 20ml 4N sulfuric acid and shake it up evenly. Lay it in a dark place for 10 minutes and add 150ml water and titrate with 0.1N sodium thiosulphate solution. Add 3ml 0.5% starch indicating liquid when approaching the end. Continue to titrate until the solution turns bright green from blue. Make a blank test simultaneously.

B.6.2.2   Calculation

The equivalent concentration N of sodium thiosulphate standard solution is calculated as formula (B6):

$$N = \frac{G}{(V_1 - V_2) \times 0.04903}$$ .... (B6)

Where: G—Weight of potassium dichromate, g;

V_1—Dosage of sodium thiosulphate solution, ml;

V_2—Dosage of sodium thiosulphate solution in blank test, ml;

0.04903—potassium dichromate gram per milligram equivalent.

B.6.3   Comparison

B.6.3.1   Determination method: Accurately measure and take 30.00~35.00ml 0.1N iodine standard solution and put it into iodine graduated flask. Add 150ml water and titrate with 0.1N sodium thiosulphate solution. Then add 3ml 0.5% starch indicator liquid when approaching the end point and continue to titrate until the blue color of solution disappears.

Make a blank test about water consuming iodine simultaneously with method as follows: take 250ml water and add 0.05ml 0.1N iodine standard solution and 3ml 0.5% starch indicating liquid. Titrate with 0.1N sodium thiosulphate solution until the blue color of solution disappears.

B.6.3.2   Calculation

The equivalent concentration N of sodium thiosulphate standard solution is calculated as formula (B7):

$$N = \frac{(V_1 - 0.05)N_1}{V - V_2}$$ .... (B7)

Where: V_1—Dosage of iodine standard solution, ml;

N_1—Equivalent concentration of iodine standard solution, N;

V—Dosage of sodium thiosulphate solution ml;

V_2—Dosage of sodium thiosulphate solution in blank test, ml;

0.05—Dosage of iodine standard solution in blank test, ml.

B.7 0.1N Iodine Standard Solution

B.7.1 Preparation: Weigh 13g iodine and 35g potassium iodide. Dilute it into 1000ml after dissolve it in 100ml water and shake it up. Store it in brown flask with stopper.

B.7.2 Calibration

B.7.2.1   Determination methods: Weigh up 0.15g benchmark arsenic trioxide which was dried to a constant weight in sulfuric acid desiccator, with a weighing accuracy of 0.0002g. Put it into the iodine graduated flask and add 4ml 1N sodium hydroxide to dissolve it. Then add 50 ml water and 2 drops of 1% phenothalin indicator liquid and neutralize it by 1N sulfuric acid. Add 3g dicarbonate and 3ml 0.5% starch indicating liquid and titrate by 0.1N iodine solution until the solution becomes light blue. Make a blank test simultaneously.

B.7.2.2   Calculation

The equivalent concentration N of iodine standard solution is calculated as formula (B8):

$$N = \frac{G}{(V_1 - V_2) \times 0.04946}$$ .... (B8)

Where: G—Weight of arsenic trioxide, g;

V_1—Dosage of iodine solution, ml;

V_2—Dosage of iodine solution in blank test, ml;

0.04946—arsenic trioxide gram per milligram equivalent.

B.7.3 Comparison: please refer to B.6.3 for method.

B.8 0.1N Potassium Hypermanganate Standard Solution

B.8.1 Preparation: Weigh up 3.3g potassium hypermanganate and dissolve it into 1050ml water. Keep the solution boiled for 15min and store it in airtight container in a dark place for two weeks after cooling. Filter into dry brown flask by 4# vitreous filter crucible.

Note: The 4# vitreous filter crucible used for filtering potassium hypermanganate solution should be boiled for 5min by same potassium hypermanganate solution, while the collection bottle should also be washed for 2~3 times by this potassium hypermanganate solution.

B.8.2 Calibration

B.8.2.1   Determination method: Weigh up 0.2g benchmark sodium oxalate which was baked to a constant weight in the temperature range 105~110? , with a weighing accuracy of 0.0002g. Dissolve it in 100ml water containing 8ml sulfuric acid and titrate with 0.1N potassium hypermanganate standard solution. Heat the solution to 65? when approaching the end point and continue to titrate until the solution appears pink color and kept for 30s. Make a blank test simultaneously.

B.8.2.2   Calculation

The equivalent concentration N of potassium hypermanganate standard solution is calculated as formula (B9):

$$N = \frac{G}{(V_1 - V_2) \times 0.06700}$$ .... (B9)

Where: G—Weight of sodium oxalate, g;

V_1—Dosage of potassium hypermanganate solution, ml;

V_2—Dosage of potassium hypermanganate solution in blank test, ml;

0.06700—sodium oxalate gram per milligram equivalent.

B.8.3   Comparison

B.8.3.1   Determination method: Measure and take 30.00~35.00ml 0.1N potassium hypermanganate solution and put it into the iodine graduated flask. Add 2g potassium iodide and 20ml 4N sulfuric acid and shake it up evenly. Put it in a dark place for 5min and add 150ml water and then titrate with 0.1N sodium thiosulphate standard solution. Add 3ml 0.5% starch indicating liquid when approaching the end point and continue to titrate until the blue color of the solution disappears. Make a blank test simultaneously.

B.8.3.2   Calculation

The equivalent concentration N of potassium hypermanganate standard solution is calculated as formula (B10):

$$N = \frac{(V_1 - V_2)N_1}{V}$$ .... (B10)

Where: V_1—Dosage of sodium thiosulphate standard solution, ml;

V_2—Dosage of sodium thiosulphate standard solution in blank test, ml;

N_1—Equivalent concentration of sodium thiosulphate standard solution, N;

V—Dosage of potassium hypermanganate solution, ml.